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Does more subnational tax autonomy promote national growth? Evidence from OECD countries (1995-2018)

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DOES MORE SUBNATIONAL TAX AUTONOMY PROMOTE NATONAL GROWTH? EVIDENCE FROM OECD COUNTRIES (1995-2018)

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Abstract.

This paper investigates the impact of an increase of subnational tax autonomy on national real GDP growth in a sample of 30 OECD countries over the period 1995-2018. The empirical results lead to the conclusion that more subnational tax autonomy favours national growth. However, if this policy risks deteriorating the fiscal stance of the regions and the local governments, its positive effect on growth will be substantially reduced. The preferred estimation method, i.e. an instrumental variable approach, attempts to deal with the reverse causality problem that arises from the fact that growing economies tend to sustain subnational tax autonomy.

Keywords: fiscal decentralization, subnational tax autonomy, national growth.

JEL: O47, H71, H77

1. Introduction.

The past century has witnessed a number of institutional reforms resulting in constitutionally decentralized developed, transitional and developing countries. The reasons underlying this trend have in many cases been inspired by the expected efficiency gains that can be obtained from decentralization according to the theory of fiscal federalism.

As early in 1972, W. Oates laid the solid economic foundations of this approach in his *Fiscal Federalism* (Oates, 1972), elaborated in his seminal paper: "*On the Welfare Gains from Fiscal Decentralization"* (Oates, 1997). The mobility of the local tax base would according to Tiebout (1956) sustain the benefits of a decentralized supply of public goods. Brennan and Buchanan(1980), Weingast (1995) and Rodden (2003) interpreted the increased efficiency of public expenditures resulting from decentralization from the point of view of reducing the monopoly power of a central, monolithic Leviathan government. This would result in competing jurisdictions across which taxpayers, capital and labour can move at no cost, thereby reducing or eliminating monopoly rents. And since local governments are held accountable towards their electorate, they are motivated to tailor public expenditures to their preferences and supply them at the lowest cost in terms of local taxes.

However, as has been clearly stated by J. Martinez-Vazquez and R. McNab (2003), there does not exist a straightforward theoretical relationship between an increase in the efficiency of public expenditures and economic growth. The welfare gains resulting from a decentralized supply of public goods refer in the first place to greater consumer efficiency that is not reflected in macroeconomic data. Whether decentralization favours producer efficiency that is relevant for economic growth, remains an open question raised e.g. by Prud'homme (1995) and Tanzi (1996). Local governments, supplying public goods and services at autonomously defined taxes in a competitive environment, may be induced to use technological innovations that raise productivity. The incentives for local governments to foster production efficiency are closely related to the institutional environment that is apt to reward their efforts in terms of an increase in local per capita income. Hence, it is difficult to conclude that decentralization will, in general, enhance the production efficiency of local public goods and services.

It is therefore not surprising that growth models, including endogenous growth type models, struggle to consistently integrate the basic features of fiscal federalism, a conclusion reached by Feld et al. (2011) in their survey of different approaches to this issue. An interesting exemption to the general conclusion of this survey is the model developed by Becker and Rauscher (2007). These authors develop a theoretical framework within a standard Barro (1990) growth model, integrating the interregional relocation costs of physical capital. The resulting optimal capital tax rate chosen by the benevolent welfare maximizing government ought to sustain a capital stock that is consistent with the consumption path desired by consumers. In this way, interregional (capital) tax competition becomes relevant in a growth model.

Notwithstanding the absence of a strand of literature on growth models incorporating features of fiscal federalism, there exists a vast empirical literature on the impact of decentralization on economic growth. Canavire –Bacarezza et al. (2019) noted, in a sample of 60 published papers on the impact of fiscal decentralization on various economic indicators, ranging from macroeconomic stability to government size, interregional income convergence and governance, that more than half of them focused on economic growth.

It is the purpose of this paper to empirically verify the relationship between national real GDP growth and a relevant indicator of subnational fiscal autonomy, more precisely the share of autonomously determined taxes in subnational total revenue. This approach focuses on the potential impact of interregional tax competition on national growth performance. In this inquiry, attention is paid to the reverse causality problem, i.e. a substantial degree of subnational fiscal autonomy may be favoured particularly in growing economies. The reverse causality issue raises the question of the endogeneity of the main independent variable in the growth equation, resulting in a biased estimate of the effect of fiscal autonomy on growth. The data used in the estimation of the growth equation is obtained from the OECD data base and covers 30 countries over the period 1995-2018.

The paper is organized as follows. The empirical literature on the impact of decentralization on economic growth will be briefly summarized in the next section. In the subsequent sections, the data, the specification and estimation method of the suggested model and the interpretation of the estimation results will be presented.The final section summarizes the main conclusions.

2. Review of the empirical research.

Thornton (2007) concluded, in the line of findings by Martinez-Vazquez and McNab (2003) that the empirical studies on the relationship between fiscal decentralization and economic growth yielded, up to the beginning of this century, mixed results., Baskaran et al. (2013) affirmed Thornton's conclusion. One possible reason for the lack of consensus on the main research question of the empirical studies had already been alluded to by Martinez- Vazquez and McNab in their 2003 paper and was restated in the survey by Martinez-Vazquez et al. (2017), i.e. the treatment of the explanatory fiscal decentralization variables as purely exogenous. To the extent that fiscal decentralization institutions tend to be promoted in growing economies, the parameter estimates of the decentralization variables are biased in view of their endogeneity character. The diverging results of the relevance of fiscal federalism to economic growth can also be attributed to the variety of estimation methods: cross-section versus panel estimation methods, structural equation versus reduced form instrumental method estimation.

Feld et al. (2011) present an overview of the relevant empirical studies starting with Davoudi and Zou (1998) who cover 40 developing and developed countries from 1970 to 1989, using five and ten year averages in a fixed effects model. They found a negative, statistically not significant impact of expenditure decentralization on real GDP per capita growth in developing countries, but no robust impact in developed countries. Contrary to these results, Thiessen (2003), covering 26 developed countries over the period 1981-1995, concluded that an increase of decentralized spending by 10 pct. raises real GDP per capita by 0.12 pct. This positive impact of expenditure decentralization on growth is supported by Imi (2005), using OLS and instrumental variable estimation in a cross-section sample of 51 developed and developing countries over the period 1997-2001. Revenue or spending decentralization does not impact growth in a statistically significant way according to Feld et al. (2004) who used a panel of 19 OECD countries from 1973 to 1998, applying a fixed effects estimation method. In this study, revenue sharing arrangements significantly and negatively impact growth, confirming the lack of subnational accountability in their way of financing. Among the studies of specific developed countries, Akai and Sakata (2002) cover the 50 US states over the period 1992-1996, using a cross-section of average growth rates and find, applying OLS and fixed effects estimation methods, that expenditure decentralization favourably impacts real GDP per capita growth.

As for empirical studies on developing countries, Lin and Liu (2000) drew attention to China, following the fiscal decentralization trend of the 1980s. They find that, as provinces are allowed to retain revenue from the national budget, this policy favoured China's real per capita GDP growth. However, this result was contradicted in a previous study by Zhang and Zou (1998) who found a negative relationship between fiscal decentralization and the real growth of the Chinese provinces during the period 1980-1992.

The research mentioned above is subject to criticism in that it fails to correctly incorporate the "true" measures of fiscal decentralization. Subnational expenditure, according to the IMF widely used GFS statistics, does not reflect the autonomy subnational governments are able to exert since it may be mandated by the central government. The same reserve holds for subnational revenue that refers to shared tax revenue or to revenue resulting from taxes fixed by the central government. Stegarescu (2005) pointed to this bias in the GFS data and developed a methodology allowing for the distinction between autonomously determined revenue and other income. Thorton (2007) applied this methodology in a cross-section study of 19 OECD

countries covering the period 1980-2000 and could not find a significant impact of autonomous subnational fiscal revenue on growth. Baskaran et al. (2013) studied the relationship between economic growth and subnational fiscal autonomy following Stegarescu's methodology for 23 OECD countries from 1975 to 2001 and reaffirmed Thorton's (2007) findings.

The OECD started at the beginning of this century to periodically publish detailed data on subnational tax autonomy for its member countries. These data fuelled new studies on the subject such as, e.g. Gemmell et al. (2013), covering 23 OECD countries from 1970 to 2005, applying Stegarescu's methodology for the years prior to 1995, for which the detailed OECD data on subnational tax autonomy are lacking. These authors apply the pooled mean group estimation technique that allows for both heterogeneous short-run effects across countries and homogeneous long- run effects. In addition, they use lagged values of the fiscal decentralization variables as instruments for their contemporaneous counterparts as a way to deal with the endogeneity of the former. The conclusion of this study is that subnational spending decreases growth whereas subnational own revenue tends to stimulate growth.

Canavire-Bacarrezza et al. (2019) criticize in this context the use of lagged endogenous variables since according to them, fiscal decentralization institutions slowly evolve over time thus leading to autocorrelation of the endogenous variables. Instead, they rely on the hypothesis that geographic heterogeneity positively correlates with the heterogeneity of preferences for local public goods, e.g. public infrastructure, and with the size of the country. In their panel study of 70 countries over the period 1981-2010 they introduce, in addition to subnational revenue and expenditure shares, a self-constructed geographic fragmentation index derived from NASA's Earth observing System Data and Information System. The drawback of introducing a geographical indicator as an instrumental variable explaining decentralization, is its time invariability as is obviously the case when using country size as an instrument. This study concludes with the finding that in OECD countries, both revenue and expenditure decentralization favourably impact economic growth, although decentralizing revenue yields a greater effect. As for Non-OECD countries, these positive effects cannot be confirmed, presumably because the level of decentralization does not reach a threshold value, beyond which a significant impact on growth may be expected.

3. Data and estimation design.

3.1 *Data sources.*

Subnational data on expenditure, revenue and public debt is available in the OECD database on fiscal decentralization. This database is also unique in that it distinguishes from 1995 onwards subnational revenue into three categories: tax revenue, intergovernmental transfers and user fees. As for tax revenue, a distinction is made between own taxes for which subnational governments have a discretionary power to set rates or decide on reliefs or both, and on the other hand shared tax revenue. Macroeconomic data on real GDP growth, output gap and trade openness can also be found in the OECD database. The macroeconomic share of gross investment in GDP and population data is obtained from the Penn World Tables (Feenstra et al., 2015).

The model presented in the next section incorporates indicators referring to the heterogeneity of the preferences of the residents in the countries studied, that have been shown to be relevant to explaining growth (e.g. by Easterly and Levine,1997). *Hief*, the historical index of ethnic fractionalization (Drazanova, 2020) is preferred because of its longitudinal dimension, covering

the countries and the time span of the current research. But since language diversity is observed in countries that are relatively homogeneous from an ethnic point of view, such as Austria, Canada and Switzerland to mention some, an indicator reflecting both ethnic and language fractionalization is relevant as well. Labart (2010) discusses the relationship between *Elf,* the ethno-linguistic indicator and indicators that measure both its language and ethnic components and presents its values for a large number of countries.

In order to cover a complete dataset in the empirical analysis over the period 1995-2019, 30 OECD countries are taken into consideration : Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, the UK and the United States. The nine federal countries studied are: Australia, Austria, Belgium, Canada, Germany, Mexico, Spain, Switzerland and the United States. In these federations, tax revenue data for regions and local governments are aggregated, using their respective tax revenue share as weights.

3.2 The main fiscal and control variables.

Subnational own tax revenue *Tax* refers to the share of autonomously determined taxes in total subnational revenue. The latter is more relevant in the framework of the empirical analysis in comparison to total general government revenue, which has been widely used in studies of revenue or expenditure decentralization. The fiscal stance of subnational governments, more precisely their public debt, may constrain their expenditure or growth oriented tax policies and is represented by the variable *Debtgdp*, i.e. the ratio of outstanding subnational debt, measured by total outstanding liabilities to GDP. Data on *Debtgdp* is obtained from the OECD Fiscal Decentralization Database. *Tax* and *Debtgdp* have been averaged over 4 years resulting in 6 period averages over the period 1995-2018, whereby the last period covers the years 2016-2018.

The purpose of using period averages in the analysis is to obtain long-run effects on growth of the explanatory variables. Nevertheless, the business cycle displayed during the period 1995-2018 remarkable swings: on the one hand a negative one during the years following the 2008 financial crisis and on the other hand an upsurge of growth in the first years of this century. In order to take account of the average business cycle effect in each period, the OECD output gap indicator represented by *Gap*, figures as a control variable in the analysis. An additional control variable that is common in studies on economic growth is the rate of capital accumulation, represented by *Inv,* i.e. the share of gross investment in GDP. It is obtained from The Penn World Tables. The control variable *Open* reflects the openness to trade and is assumed to favour growth. It is measured by the ratio of the sum of exports and imports to GDP and is obtained from the OECD National Accounts. In order to test for the impact of ethnic and cultural fragmentation on growth, the time variant variable *Hief* described above, figures as a control variable, Finally the growth rate of population, *Grpop* controls for the fact that the dependent variable *Growth,* i.e. the rate of growth of real GDP, is not calculated on a per capita basis.[1]

[1]The absence of an explicit link with an underlying neoclassical growth model, such as Barro's (1990) in this exploratory empirical research, justifies the use of real GDP growth instead of real GDP growth per capita.

As will be discussed in the sequel, additional explanatory variables are needed to control for the potential endogeneity of subnational tax autonomy. It is reasonable to assume that, as subnational governments acquire more political autonomy, they will institutionally be more enabled to autonomously design their revenue framework. Therefore, the exogenously assumed variable *Self* is an appropriate indicator to express subnational political autonomy. It is obtained from Hooghe et al. (2016) and refers to the aggregate variable "Selfrule" in this dataset. It reflects the degree of representative authority that local and regional governments are able to exert in their respective jurisdictions in order to tailor their policies to the preferences of the electorate. Above average values of *Self* are obtained for the federal countries Belgium, Canada, Germany, Spain, Switzerland and the US. Furthermore, since ethno-linguistic diversity positively impacts decentralization tendencies, the time invariant and exogenous indicator *Elf* referred to above, is assumed to indirectly and positively affect subnational tax autonomy.

The main statistical characteristics of the dependent and independent variables are reported in table 1. Special attention is given to the stationary character of the variables, a feature that apparently has been neglected in some of the empirical research referred to. Relating auto-correlated independent variables to a stationary dependent variable, i.e. *Growth*, results in biased estimates of the parameters of the former. The stationarity of the independent variables was tested by the Harris-Tzavalis (1999) unit root test which is appropriate for samples where *n* is large and *t* is small, which is the case in the sample under review (*t*=6, *n*=30). Table 1 shows that the variables *Growth, Gap* and *Grpop* are, according to this unit root test, stationary at a 5 pct. significance level. On the other hand, the variables *Tax, Inv, Open, Debtgdp* and *Hief* are, at the same significance level, clearly non-stationary.

3.3 Specification of the Baseline Model.

The variable *Tax,* is assumed to positively impact the rate of growth of real GDP. The main economic control variables are the rate of investment *Inv*, the openness of the economy *Open* and the indebtedness of the local governments, represented by *Debtgdp.* In addition, the period average output gap variable *Gap,* is also assumed relevant for the period average growth of real GDP. In order to control for the effect of the heterogeneity of the preferences of the residents on growth, the variable *Hief* figures as a control variable. Finally, the growth rate of the total population *Grpop* is assumed to positively impact economic growth.

First-differencing the non-stationary independent variables *Tax, Inv*, *Open, Debtgdp* and *Hief* is assumed to control for biased estimation results (Wooldridge, 2013, pp.429-430). This results in the following basic specification:

$$Growth_{it}=\alpha+\beta_1.\Delta Tax_{it}+\beta_2.\Delta Inv_{it}+\beta_3.\Delta Open_{it}+\beta_4.Gap_{it}+\beta_5.\Delta Debtgdp_{it}+\beta_6.\Delta Hief_{it}+\beta_7.Grpop_{it}$$

$$+\tau_i+\mu_{it}\ (i=1,2,3\ldots30;\ t=1,2,3\ldots6) \qquad (1)$$

The country specific effect is denoted by τ_i , μ_{it} is the time and country related error term. The basic equation will be estimated by panel estimation methods, i.e. fixed effects (FE) or alternatively random effects (RE). In order to show the relevance of first differencing the non-stationary independent variables, an OLS estimation of equation (1) but without differencing the independent non-stationary variables, is reported in the appendix. The residuals of this estimation clearly display significant positive autocorrelation, pointing to biased parameter estimates of the non-stationary independent variables

Table 1. Summary Statistics of the Dependent and Independent Variables.

Variable	Mean	Std. Deviation	Min	Max	Stationary	Observations
Growth	*2.314*	*1.860*	*-5.9*	*9.5*	*YES*	*180*
Tax	*27.537*	*19.547*	*0*	*73.8*	*NO*	*180*
Inv	*25.254*	*4.493*	*14*	*39.0*	*NO*	*180*
Open	*87.856*	*40.228*	*23*	*217.0*	*NO*	*180*
Debtgdp	*10.555*	*10.012*	*0.75*	*56.3*	*NO*	*180*
Gap	*-0.471*	*2.243*	*-11.20*	*7.2*	*YES*	*180*
Hief	*0.266*	*0.195*	*0*	*0.73*	*NO*	*176*
Grpop	*2.755*	*3.800*	*-7.36*	*25.8*	*YES*	*150*
Self	*11.566*	*7.492*	*0*	*26.7*	*NO*	*180*
Elf	*0.233*	*0.187*	*0*	*0.7*	*---*	*180*

The expected signs of the parameter estimates in (1) are: β_1 , β_2 , β_3 , β_4, β_7 >0 , β_5<0. The impact of ethnic and cultural diversity on economic development has been subject to an impressive literature, leading to controversial results. Whereas Easterly and Levine (1997) showed that ethnic diversity has a direct negative impact on growth, other scholars, e.g. Bellini et al. (2008) found at the turn of the century in a sample of 900 EU15 regions, that cultural diversity positively effects productivity. In view of these controversial findings, the sign of β_6, the parameter of $\Delta Hief$ remains undefined.

In order to tackle the potential endogeneity of the tax variable in equation (1), an instrumental variable approach (IV) to equation (1) is appropriate. The candidate instrumental variables that directly correlate with *Tax* but are uncorrelated with *Growth* are ΔElf (r= 0.0492), $\Delta Self$ (r=-0.290) and the interaction variable $\Delta SelfElf$ (r=-0.102). The relevance of these candidate instruments for ΔTax shows up in the fixed effects estimates clustered at the country level of equation (2):

$$\Delta Tax_{it} = 0.019 + 1.772^{***}\ \Delta Self_{it} + 32.275^{*}\Delta Elf_{i} - 3.587^{**}\Delta Self.Elf_{it} \qquad (2)$$
$$(0.608) \qquad (17.755) \qquad (1.583)$$

where stars refer to the significance levels : *** p<0.01, **p<0.05, *p<0.10. R^2=0.247.

The parameter estimates of $\Delta Self$ and ΔElf are in line with the expectations, although the significance level of the latter is relatively smaller. The negative sign of the interaction variable $\Delta Self.Elf$ requires further explanation. Countries where above average values of both *Self* and *Elf* coincide are the following 7 federations: Australia, Belgium, Canada, Mexico, Spain, Switzerland and the US. Germany displays an above average value for *Self* but is, according to its below average score of *Elf,* a relatively homogeneous federation from the ethnic and cultural point of view. On the other hand, Austria can be considered as a cultural and ethnically homogeneous federation, but scores below average on *Self.* In contrast, France, Italy, Sweden and Norway simultaneously display above average values of *Self* and below average scores of *Elf,* pointing to an ethnically and culturally homogeneous population. These opposite scores for *Self* and *Elf* for many countries in the sample explain the negative, but statistically significant estimate of the parameter of the interaction variable $\Delta Self.Elf$ that impacts ΔTax.

Equation (1) was estimated with fixed effects (FE), random effects (RE) and instrumental variable (IV) panel estimation methods. The Hausman test clearly revealed that the RE approach is more relevant than the FE model (p=0.14). The RE estimates and the results of the IV estimation are presented in table 2. A Wu-Hausman test of the exogeneous character of the independent variables in (*2*) confirmed the appropriate use of $\Delta Self$ and $\Delta Self.Elf$ as instruments for ΔTax, whereas this test clearly rejected ΔElf as a candidate instrument. Consequently, only $\Delta Self$ and $\Delta Self.Elf$ figure as instruments in the IV estimation.

4. Empirical results.

Both the RE and IV estimates in table 2 confirm the positive impact of an increase of subnational tax autonomy on the growth rate of real GDP, although its effect is substantially larger in the IV approach, i.e. 0.164, where the endogeneity of the tax variable is corrected for. Both the RE and IV estimates of the parameter of the change of the share of autonomous taxes in subnational revenue suggest that more tax autonomy for the regional and local governments is beneficial for national growth. According to its parameter estimate, an increase of the share of autonomous taxes in subnational total revenue by 10 percentage points contributes to an improvement of the growth rate of real GDP of 1.64 points. Since the long run growth rate of GDP, represented by the significant estimate of the constant term amounts to 1.75 percent, this tax policy shift would result in a long run growth rate of not less than 3.39 percent.

It is obvious that such a policy scenario is not realistic. Focusing on the 9 federations in the sample, their average of *Tax* amounts to 41.1 percent, an autonomous tax share that is largely exceeded in Switzerland, Spain and Canada. Below average values of subnational tax autonomy are found in Austria, Germany and Mexico, theoretically leaving in these federations room for further strengthening the fiscal autonomy of the regions.

An important channel through which this positive impact can be realized is the scope for tax competition by less developed regions, enabling them to attract mobile investment and skilled labour, thus narrowing the gap with their more developed counterparts (Blöchliger et al. 2016; Van Rompuy, 2020). A tax policy shift from the central government to the regions and local governments is however constrained by the risk of deteriorating their fiscal stance in the case of tax cuts reducing their fiscal revenue. This constraint is reflected in the negative parameter estimate of the subnational debt to GDP ratio, i.e. the variable $\Delta Debtgdp$. Both the RE and IV estimates of the parameter of this variable are significant and imply that- independently of a change in *Tax-,* an increase of the subnational debt ratio of 10 percentage points lowers the growth rate by 1.1 percent.

The significant parameter estimates of $\Delta Open$ confirm the positive contribution of the openness of the economy to growth. The same finding holds for the IV estimation of the parameter of the capital accumulation variable ΔInv. Its contribution to growth is more than threefold larger than the corresponding impact of the tax variable. Furthermore, an upswing of the business cycle, represented by *Gap,* apparently accelerates the rate of growth. A significant impact on growth of the change of the ethno-cultural characteristics of the population, reflected by $\Delta Hief$, could not be confirmed. This finding also holds for the growth of the population, denoted by *Grpop.*

Table 2. Panel RE and IV estimates of the baseline equation (1).

Dependent variable: Growth

	RE estimates	*IV estimates (RE)*
ΔTax	*0.096****	*0.164****
	(0.031)	*(0.0.63)*
ΔInv	*0.053*	*0.594**
	(0.034)	*(0.034)*
$\Delta Open$	*0.043**	*0.036***
	(0.016)	*(0.017)*
Gap	*0.191****	*0.178****
	(0.041)	*(0.042)*
$\Delta Debtgdp$	*-0.115**	*-0.107**
	(0.063)	*(0.064)*
Grpop	*0.058*	*0.056*
	(0.036)	*(0.036)*
$\Delta Hief$	*-5.229*	*-3.215*
	(10.004)	*(10.594)*
Constant	*1.766****	*1.754****
	(0.261)	*(0.280)*
R^2	*0.305*	*0 .278*

*Note: Number of observations: 145;Robust standard errors (in RE clustered at the country level) are in parenthesis. Stars refer to the significance level:***p<0.001, **p<0.05, *p<.10.*

The robustness of the estimates in table 2 was tested by introducing additional control variables that are relevant in explaining growth, such as the age dependent population share (population over 64 to the population between 14-64) and an indicator of the political autonomy of the subnational governments, obtained from Hooghe et al. (2016). However, adding these variables in the RE and IV estimation of the baseline equation (1) did not significantly impact the estimates in table 2. Furthermore, the linearity in first differences of the independent variables of the baseline equation may be questioned. As for the variable ΔTax, it is indeed conceivable that the impact of subnational tax autonomy on growth displays an inverted U-shape, implying that its contribution to growth levels off as tax autonomy reaches high levels. Exploring non-linear effects of subnational tax autonomy on growth opens perspectives for future research.

A final remark relates to the potential conflicts arising from the tax policies pursued by the subnational governments and the central government, particularly when both levels of government exploit the same tax base, e.g. personal income. This leads to the recommendation that, particularly in federations, an institutional coordination between the fiscal policies of the regions and the central government is appropriate, as has frequently been advised in the IMF country reports.

5.Conclusions.

The inconclusive results obtained in in the recent literature of the impact of fiscal decentralization on macroeconomic growth, has to a large extent been ascribed to an inappropriate measurement of the fiscal autonomy of subnational governments. In addition, the reverse causality between economic development and fiscal decentralization presumably blurred the estimation results. This paper attempts to show that autonomously raised tax revenue strongly induces subnational governments to implement growth–enhancing policies. This finding results from an instrumental estimation method that to some extent tackles the reverse causality issue. The channels through which subnational governments are able to exert their tax autonomy, vary from rebates on the personal income tax to reductions of property and local business taxes, depending on their specific institutional setting. It may be objected that more developed regions are able to implement a growth promoting tax policy as well, resulting in a zero-sum outcome with the less developed regions. However, related research indicates that less developed regions, when using their tax autonomy, are able to close the gap with their richer counterparts, resulting in an increase of the national growth rate.

Appendix.

Appendix Table 1. OLS Estimation of Equation (1) without Differencing.

	Dependent variable: Growth
Tax	*0.014**
	(0.008)
Inv	*-0.047*
	(0.034)
Open	*0.013****
	(0.004)
Gap	*0.092*
	(0.062)
Debtgdp	*-0.035***
	(0.017)
Grpop	*0.073**
	(0.040)
Hief	*1.010*
	(0.860)
Constant	*1.572**
	(0.902)
R^2	*0.140*

*Note: Number of observations: 145;Robust standard errors (in RE clustered at the country level) are in parenthesis. Stars refer to the significance level:***p<0.001, **p<0.05, *p<.10.*

Appendix Table 2. Autoregressive Results of Residuals of Estimates in Appendix Table 1.

$$e_{it} = \theta + \rho.\ e_{it-1}$$

e_{it-1}	*0.187***
	(0.086)
Constant	*-0.217*
	(0.152)
R^2	*0.040*

*Note:: Number of observations: 116. Standard errors) are in parenthesis. Stars refer to the significance level:***p<0.001, **p<0.05, *p<.10.*

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